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CREW'S WATER CLOSETS
DESCRIPTION AND OPERATING
INSTRUCTIONS
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I. DESCRIPTION

A. PURPOSE AND SPECIFICATIONS

P u r p o s e

The submarine is provided with 3 water closets and 4 urinals. Two of the water closets and two urinals are located in compartments in the pressure hull and one water closet and two urinals are located in the conning tower sail.

The water closets and urinals located in the pressure hull are designed for use both in the submerged and surface conditions of the submarine.

The water closet and urinals located in the conning tower sail are designed for use only in the surface condition of the submarine.

The water closets located in the pressure hull are of the air expulsion type, while the water closet located in the conning tower sail is of the gravity flush type.

S p e c i f i c a t i o n s

1. A funnel-shaped toilet bowl is fabricated of enamelled steel.
2. A 150-litre waste receiver fabricated of steel and fitted with a flange connection is rated for a working pressure of 35 kgf/cm².
3. A smell absorbing filter uses cupramite as chemical absorbent, its service term being an endurance cruise.
4. A Genoa-type toilet bowl of the gravity flush water closet is fabricated of steel.
5. A piston-type double-acting hand pump has one cylinder with the output of 12 lit/min and the suction lift of 5 m H₂O.
6. Pipe lines of the water closets are made of copper pipes, dia. 90 x 5; 85 x 2.5 and 55 x 3.5 with flange connections, and pipes, dia. 38 x 2.5; 24 x 2; 14 x 2 and 9 x 1.5 with pipe connections. Gaskets are paronite.

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B. DESCRIPTION

1. Air Expulsion Water Closets

(See Appendix No.1)

The air expulsion water closets are located in special recesses:

- in compartment III between frames 48 - 51, port side;
- in compartment VI between frames 105 - 107, starboard.

Both of them are similar in design.

They consist of a toilet bowl with a flapper, waste receiver, smell absorbing filter, pipes, fittings and pressure gauges.

The toilet bowl with the flapper is flushed with sea water supplied:

- (a) in the submerged condition through stop valves 60 and 62, reducing valve 61 and flush valve 57;
- (b) in the surface condition through stop valves 60 and 59;
- (c) in the surface condition when there is pressure in the sea water line of the drinking, washing and draining water system through non-return stop valve 63 and flush valve 57.

The waste from the toilet bowl is drained through the flapper and elbow 56, acting as a hydraulic seal, into the waste receiver. In this case the waste receiver is ventilated through butterfly valve 54 and smell absorbing filter 52 into the water closet recess.

After the waste receiver is filled with waste, hull flapper valve 58 is opened and the waste is then expelled overboard with air pressure.

The air necessary to blow the waste receiver is supplied under the bowl flapper from the medium air pressure line through butterfly valve 53 where the air pressure is reduced from 35 kgf/cm² down to the value necessary for the given depth. This air pressure is checked by means of pressure gauge 50.

While blowing the waste receiver the air is also supplied through an interconnecting pipe with valve 55 to the waste receiver vent pipe. The interconnecting pipe is provided for blowing the vent pipe to expel the water remaining in the vent pipe after the waste receiver is overfilled with waste. Stop valve

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mounted on the interconnecting pipe is provided for blowing elbow 56 when it is clogged with the valve being closed.

After blowing the waste receiver (or the elbow) the air is bled from the system into the recess through butterfly valve 54 and smell absorbing filter 52. The air pressure in this case is checked by means of pressure gauge 51 and should not exceed 0.5 kgf/cm^2 .

The drain pipe with a stop valve from the wash-stand is connected to a branch pipe connection welded to a sewer pipe between elbow 56 and the waste receiver in compartment III.

The stop valve of the water supply line for the electric distilling unit is mounted on a boss welded to the sea water pipe between stop valves 60 and 62 in compartment VI.

2. Urinals in Compartments I and V

(See Appendix No.3)

In compartment I the urinal is located in the vicinity of frames 29 - 30, starboard.

Sea water for flushing the urinal is supplied from the sea water line of the drinking, washing and draining water system from compartment II through straight-way cock 85.

From the urinal the water is drained through straight-way cock 86 into sanitary tank No.1 in compartment II.

In compartment V the urinal is located in the vicinity of frames 82 - 83, port side.

Sea water for flushing the urinal is supplied from the sea water line of the drinking, washing and draining water system through straight-way cock 89.

From the urinal the water is drained through straight-way cocks 88 and 87 into sanitary tank No.2 in compartment IV.

3. Gravity Flush Water Closet

(See Appendix No.2)

The gravity flush water closet is located in the conning tower sail in the vicinity of frames 57 - 60, port and starboard. It consists of a Genoa-type toilet bowl, two urinals, hand-operated pump and pipes with fittings.

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Sea water for flushing the Genoa-type bowl, urinals and garbage disposal shoot is supplied through three-way valves 76, 77 and 71 by turning them accordingly:

- (a) from the pressure tank of the drinking, washing and draining water system. Water to the pressure tank is supplied by the hand-operated pump or from the engine exhaust cooling line through non-return valves 73 and three-way valves 77 and 76;
- (b) from the hand-operated pump (by-passing the pressure tank) through three-way valves 76, 77 and 71;
- (c) from the engine exhaust cooling line (by-passing the pressure tank) through non-return stop valves 73 and three-way valves 77, 76 and 71.

Stop valve 75 and hose 74 are intended to supply water for cleaning the water closet recess in the conning tower sail.

Drainage cock 72 serves for draining water from the line.

4. Toilet Bowl with Flapper and Flush Valve

(See Appendix No.4)

The toilet bowl includes the following components: a bowl, stool with a cover, flapper and a flush valve.

The flapper operates in the following way. As soon as pedal 96 is pressed, link 97 is displaced, thus turning shaft 110. The shaft opens flapper disc 113.

At the same time link 97 presses tappet 111 that opens flush valve 57 and water from the sea water line is supplied to the bowl.

After pedal 96 is released, return spring 98 closes the flapper and valve disc 104 fits in the seat by spring 103, thus discontinuing water supply to the bowl.

5. Hull Flapper Valve

(See Fig.1)

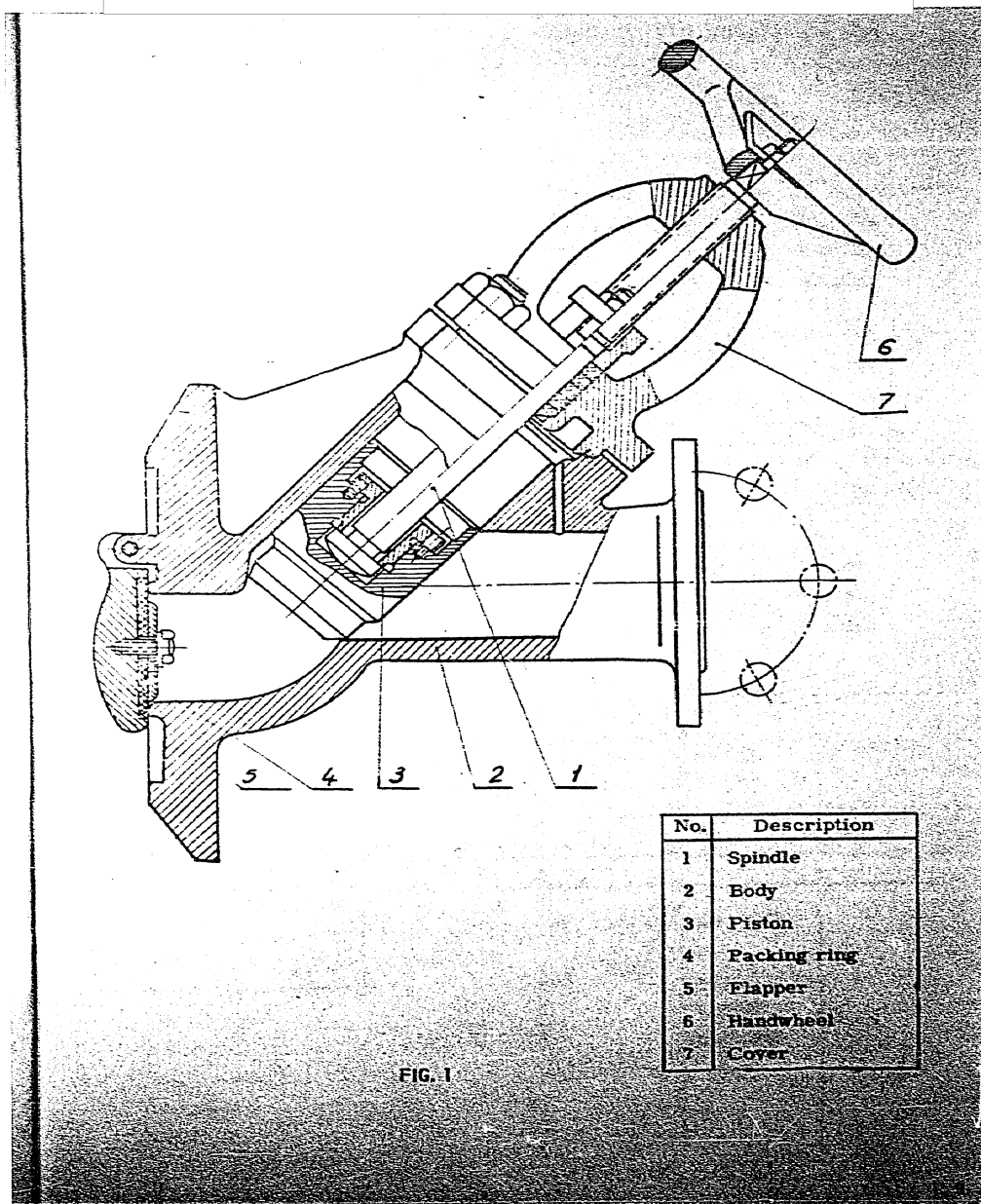
The design of this valve is very simple. It is clearly shown in Fig.1, therefore there is no need for its description. Valve 58 operates in the following way. When the waste receiver is to be blown, piston 3 is raised by spindle 1 by turning handwheel 6 and flapper 5 is opened by the water flow. As soon as the blowing of

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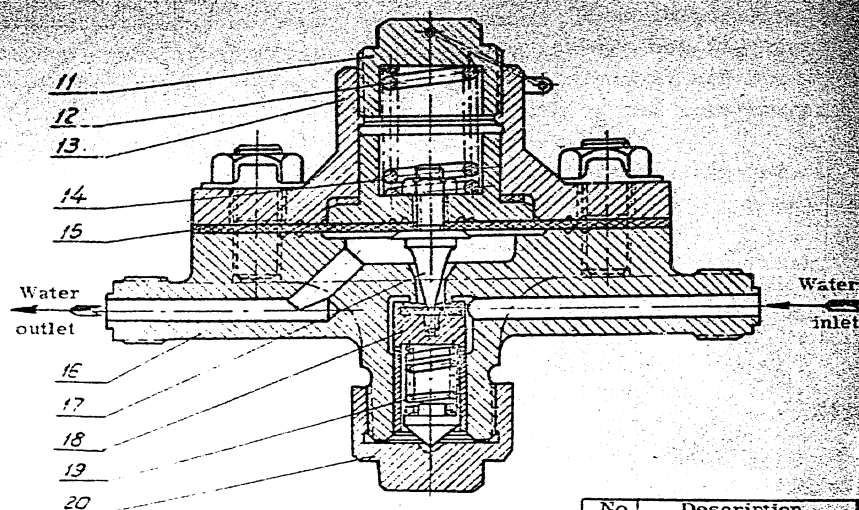


FIG. 2

No.	Description
11	Plug
12	Spring
13	Cover
14	Sleeve
15	Diaphragm
16	Body
17	Tappet
18	Disc
19	Spring
20	Nut

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the system is over, flapper 5 is pressed by its weight to the coaming on the body of the flapper valve.

6. Reducing Valve

(See Fig.2)

The reducing valve reduces the pressure of sea water supplied to the flush line down to the value of 1 - 2 kgf/cm². The valve operates automatically. Valve disc 18 is shifted downwards by spring 12 and upwards by the water pressure applied to diaphragm 15.

With the water pressure at the valve inlet being less than 1 kgf/cm², the valve is open, thus allowing the water to flow into the water outlet branch pipe. As soon as the water pressure at the outlet is above 2 kgf/cm², the pressure applied to diaphragm 15 will overcome the resistance of spring 12 and disc 18 will be shifted upwards by spring 19, thus partially closing the passage and setting up additional resistance. As a result, the water pressure at the valve outlet will drop.

C. MEASURING INSTRUMENTS

Table 1

Ref. No. in diagram	Description	Type of instrument and scale range	Normal indication	Maximum indication	Place of installation	Remarks
1	2	3	4	5	6	7
50	Pressure gauge for measuring pressure of air supplied to waste receiver	MTK100E 0- 60 kgf/cm ²	1 - 30 kgf/cm ²	30 kgf/cm ²	In each air expulsion water closet	

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1	2	3	4	5	6	7
51	Pressure gauge for measuring pressure of air in waste receiver vent pipe	MTK100B 0 - 1.6 kgf/cm ²	0 - 0.5 kgf/cm ²	0.5 kgf/cm ²	In each air expulsion water closet	

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II. USE AND MAINTENANCE

A. GENERAL

1. In case of use of the air expulsion water closets the recesses should be ventilated in accordance with the Description and Operating Instructions of Ventilation and Air Conditioning System.

2. During service the pipes and fittings of the water closets should be kept clean and in good repair.

See to it that the water closet equipment is reliably attached to the hull framing; take necessary measures to protect it from shocks and damage.

3. During service of the water closet equipment it is required to:

(a) keep the pipes and fittings in the condition of permanent readiness for use;

(b) see to it that the pipes and fittings are always airtight and pay special attention to the condition of the outboard fittings and connection flanges;

(c) see to it that all valves and cocks are easily accessible; NEVER obstruct the fittings;

(d) open the valves in the pressure lines gradually;

(e) periodically grease the friction surfaces of the fittings;

(f) tighten and repack the glands of the fittings as required;

(g) maintain in good order all the inscription plates on the fittings;

(h) recondition the painting on the pipes in due time.

4. See to it that the measuring instruments (pressure gauges) are in good operating condition and sealed. If the instruments give incorrect readings or the seal is damaged, as well as in case of expiration of the term of their check, remove and send them for check or replace.

5. Inspect the pipes for corrosion and check them for cracks and honeycombs, tightness of the pipe connections and

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condition of the fittings; check the waste receiver and bowl for condition.

6. During disassembly and reassembly operations close the open ends of the pipes with metal or wooden plugs to protect them from foreign objects. NEVER close the open ends of the pipes with waste cloth or tow since it can penetrate inside the pipe.

7. DO NOT use unspecified tools during disassembly or reassembly operations to avoid damage to parts.

8. The types, sizes and materials of the new pipes and fittings installed during repair should correspond to the specified ones. After each repair, test the repaired sections of the pipe lines for air-tightness in accordance with Table 3.

9. NEVER blow the waste receiver with air whose pressure is higher than 30 kgf/cm².

10. DO NOT use the gravity flush water closet at the ambient temperature below +5°C.





B. PREPARATION FOR USE

(a) Initial Position

(See Appendices Nos 1, 2 and 3)

11. The waste is drained from the waste receivers.

12. The smell absorbing filters are installed in their due places.

13. All the valves and cock 72 are closed except for valve 54. The plugs of three-way valves 76, 77 and 71 are turned to positions ,  and  respectively, while the plugs of straight-way cocks 85, 86, 87, 88 and 89 are turned to position .

(b) Preparation of Air Expulsion Water Closet for Use in Submerged Condition

(See Appendix No.1)

14. Open butterfly valve 54 of the waste receiver vent pipe.

15. Open stop valve 52 (second lock).

16. Open hull valve 60 (first lock).

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(c) Preparation of Air Expulsion Water Closet for Use
in Surface Condition and Submerged Condition When
Valve 57 or 61 Is Out of Order
(See Appendix No.1)

17. Open butterfly valve 54 of the waste receiver vent pipe.
18. Open hull valve 60 (first lock).


(d) Preparation of Air Expulsion Water Closet for Use
in Surface Condition When There Is Pressure in Sea
Water Line

19. Open butterfly valve 54 of the waste receiver vent pipe.
20. Check if there is pressure in the sea water line in accordance with the maintenance instructions for the drinking, washing and draining water system.
21. Open non-return stop valve 63.

(e) Preparation of Gravity Flush Water Closet for Use
(See Appendix No.2)

22. Fill the pressure tank with sea water by the hand pump or if the diesels are running fill it from the engine exhaust cooling line by turning the plug of three-way valve 77 to position  and the plug of valve 76 to position .

(f) Preparation of Urinals in Compartments I and V
for Use
(See Appendix No.3)

23. Supply water to the sea water line as prescribed in the maintenance instructions for the drinking, washing and draining water system.
24. Turn the plugs of straight-way valves 86, 87 and 88 to position  for draining water from the urinals.

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C. INSTRUCTIONS FOR USE

(a) Use of Air Expulsion Water Closets in Submerged Condition
(See Appendix No.1)

25. After each use of the water closet flush the toilet bowl by pressing pedal 96.

CAUTION! 1. To avoid damage of packing 108 on flapper disc 113 gradually release pedal 96 after flushing the toilet bowl.
2. Do not drop waste cloth, tow , tissue paper, etc. into the toilet bowl.

(b) Use of Air Expulsion Water Closets in Surface Condition and in Submerged Condition When Valve 57 or 61 Is Out of Order

26. Gradually open stop valve 59 for flushing the toilet bowl to allow some water to fill the bowl throat.

27. Close valve 59.

28. After use of the water closet open valve 59 and allow 3 - 4 litres of water to enter the toilet bowl; after that close valve 59.

29. Flush the toilet bowl by pressing pedal 96.

(c) Use of Air Expulsion Water Closets in Surface Condition When There Is Pressure in Sea Water Line
(See Appendix No.1)

30. After use of the water closet flush the toilet bowl by pressing pedal 96.

(d) Expulsion of Waste from Waste Receiver
(See Appendix No.1)

31. Observe the pressure gauge on the expander in compartment III to make sure that the pressure in the medium air pressure line is higher than the outboard pressure.

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32. Close butterfly valve 54 of the waste receiver vent pipe. Before blowing the waste receiver of compartment III close the valve on the water drainage pipe of the wash-stand in compartment III.

33. Open hull flapper valve 58 to expel the waste from the receiver.

34. Open butterfly valve 53 designed for blowing the waste receiver and see to it that the pressure indicated by pressure gauge 50 is higher than the outboard pressure by 1 - 2 kgf/cm².

The end of the blowing procedure is determined by noise produced by air coming outboard and by a pressure drop as indicated by gauge 50.

35. Close butterfly valve 53.


36. Close hull flapper valve 58.



37. Bleed air from the waste receiver by slightly opening butterfly valve 54 of the receiver vent pipe and ascertain that the air pressure indicated by gauge 51 does not exceed 0.5 kgf/cm².


38. After blowing the waste receiver open butterfly valve 54 completely.


(e) Use of Gravity Flush Water Closet

(See Appendix No.2)

39. After use of the water closet flush the Genoa-type bowl by turning the plug of three-way valve 76 to position .

40. After use of the urinals set the plug of three-way valve 71 in position  or  to flush the urinal that has been used.

41. After use of the garbage disposal line turn the plug of three-way valve 77 to position  to flush the line.

42. To supply water to hose 74, turn the plug of three-way valve 76 to position  open stop valve 75 and use hose 74 to flush the Genoa-type bowl, urinals, garbage disposal line, flooring, etc.

CAUTION! When the ambient air temperature drops below +5°C, open cock 72 to drain water from the gravity flush water closet. Otherwise it can freeze in the pipes.

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(f) Use of Urinals in Compartments I and V

(See Appendix No.3)

43. After use of the urinals, set the plug of straight-way valve 85 or 89 in position  to flush the urinal in compartment I or V.

D. MAINTENANCE DURING LONG PERIOD OF OFF-SERVICE

44. When the water closet is not used for a long period of time, perform the following operations:

(a) drain water from the pipes by disassembling the pipe connections in low places and blow the pipes with compressed dry air;

(b) flush the waste receiver and the sewer pipe with water and blow them with compressed dry air;

(c) examine the valves and cocks, clean them and then coat with antirust grease. If necessary, replace the gaskets, gland packing and the smell absorbing filters;

(d) disassemble the toilet bowl flapper, non-return and non-return stop valves, clean them and examine the packings; replace the worn-out and cracked packings and coat the parts with antirust grease;

(e) disassemble the hand pump in the conning tower sail, clean its parts and coat them with gun grease;

(f) remove the flaky paint from the pipes and paint them anew as required; do not fail to make the necessary marks;

(g) inspect the pressure gauges from outside. Replace the pressure gauges with damaged or corroded parts by new ones. Check the pressure gauges found in the satisfactory condition against the reference pressure gauge.

45. To prepare the water closet for use after a long period of off-service, do the following:

(a) remove antirust coating from the exposed surfaces of the drives of the fittings and pipes with waste cloth wetted in diesel oil and coat them with the prescribed grease. Work out the drives. Eliminate the detected defects;

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- (b) blow the pipes with compressed air. If necessary, replace the smell absorbing filters;
- (c) fill the waste receivers with water and then blow them with compressed air overboard.

E. TROUBLES AND REMEDIES

46. Before disassembly of the pipes or fittings make sure that the pipes are not under pressure; otherwise, bleed the compressed air and drain water.

Possible troubles and their remedies are given in Table 2.

Table 2

Trouble	Cause	Remedy
While flushing toilet bowl, water fails to drain or drains but very slowly into waste receiver	1. Waste receiver is filled 2. Elbow 56 is clogged	1. Blow waste receiver. 2. Blow elbow 56 for which purpose close valve 55 on interconnecting pipe and perform operations 31 through 38; do not fail to open valve 55 after operation 34
Water fails to enter bowl after pedal 96 is pressed	Flush valve travel disadjusted	Adjust travel of flush valve 57 (it should be about 13 mm): (a) use adjustment screw 114 to make flush valve 57 start opening after flapper starts opening; (b) obtain maximum travel of tappet 111 of flush valve 57 by means of adjustment screw 114;

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Trouble	Cause	Remedy
		(c) with flapper disc 113 fully opened, flush valve 57 should have free travel of 1 - 1.5 mm

F. PREVENTIVE INSPECTIONS AND REPAIRS

Carry out all preventive maintenance inspections and repairs in accordance with the requirements given below.

Daily Inspection

47. Examine and clean all exposed parts of the water closet.

48. Inspect the pressure gauges from outside and make sure that they are sealed.

Weekly Inspection

Perform all the operations of the daily inspection and in addition to that, do the following:

49. Check and work out all the fittings of the water closet.

50. Check spring 98 for tension and flapper disc 113 for close fit in the toilet bowl for which purpose prior to blowing the waste receiver, allow 1 - 2 lit. of water to enter the toilet bowl through valve 59; see to it that no bubbles appear during blowing.

51. Check hull flapper valve 58 for tightness, for which purpose build up the pressure in the waste receiver and see to it that no bubbles appear at the outlet of flapper valve 58. Check the system for functioning.

52. Every two months and each time before setting out for an endurance cruise replace the smell absorbing filter.

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53. Every year send the pressure gauges for test check. Once a year and each time after elimination of defects involving the disassembly of the pipes check the tightness of the pipes in accordance with Table 3.

Inspection during Submarine Docking

54. Disassemble, inspect and reassemble the outboard fittings of the water closet equipment. Test all the pipes of the water supply lines under pressure.

Inspection during Running Repairs

55. Overhaul the water closet equipment and replace the worn-out parts. Replace rubber sealing parts. Check the tightness of the pipes of the air supply lines in accordance with Table 3.

Preventive Inspections of Water Closets
during Long Period of Off-Service

M o n t h l y I n s p e c t i o n

56. Inspect the water closet equipment from outside, remove dust and traces of lubricant. Make sure that the equipment is not dampy.

T a b l e 3

Nos	Names of pipes and testing procedure	Test pressure applied to pipes in assembly with fittings, kgf/cm ²	Remarks
1	2	3	4
1	Pipes given below are tested in two stages together with medium air pressure pipes: (a) pipes from medium air pressure line up to closed valves 53	35	

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1	2	3	4
	(b) pipes from medium air pressure line up to closed valves 54, 58 and valve on wash-stand drainage pipe in compartment III	35	No air bubbles should appear at outlet of flapper valve 58
2	Pipes from valves 63 up to valves 57, 59 and 60	38	
3	Pipes from sea water pipe line up to valves 63 together with sea water pipe line of drinking, washing and draining water system	12.5	

Hydraulic Test of Pipes from Valves 63
up to Valves 57, 59 and 60

The hydraulic test of the pipes for air-tightness is carried out by means of the hand-operated pump. To this end, do the following.

57. Disconnect the pipe running from the toilet bowl to valve 59 from valve 59 and connect the pump to the valve.

58. Close valves 60 and 63 and the valve designed for the electric distilling unit in compartment VI, open valves 59 and 62 and operate the pump to fill the pipes with water. Ventilate the pipes by opening flush valve 57.

59. Build the pressure of 38 kgf/cm² and check the connections of the pipes and fittings for tightness.

60. Disconnect the pump from valve 59 and connect to the valve the pipe that has been disconnected earlier.

61. Disconnect the pipe running from the sea water line to valve 63 from valve 63 and connect the pump to the valve.

62. With valve 63 being open, fill the pipes with water. In this case ventilate the pipes by opening flush valve 57.

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63. Build the pressure of 38 kgf/cm² by means of the pump and check the connections of the pipes and fittings for tightness.

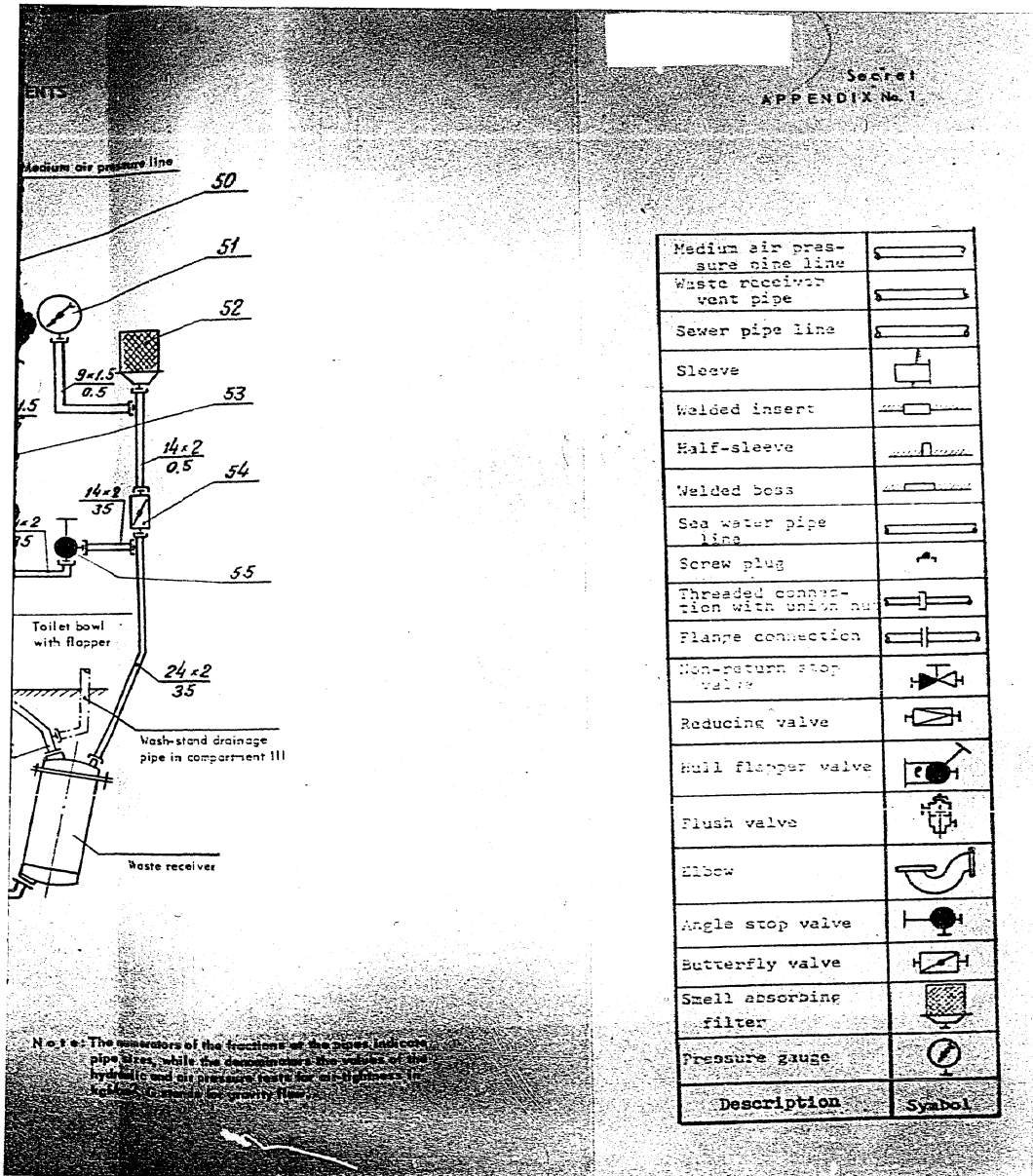
64. Disconnect the pump from valve 63 and connect to the valve the pipe that has been disconnected earlier.

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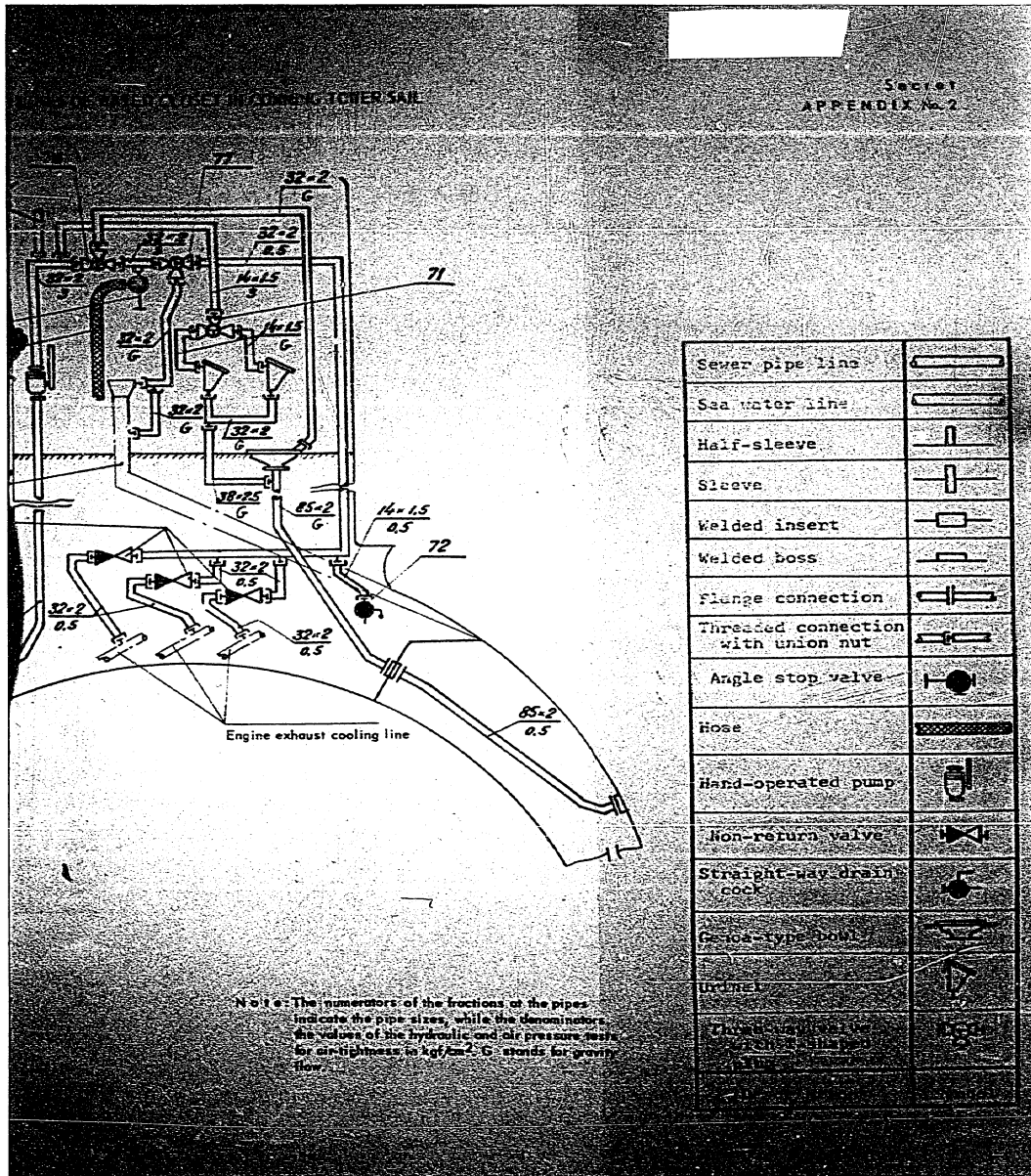
PIPE LINES OF WATER CLOSET IN COMPARTMENTS
III AND VI



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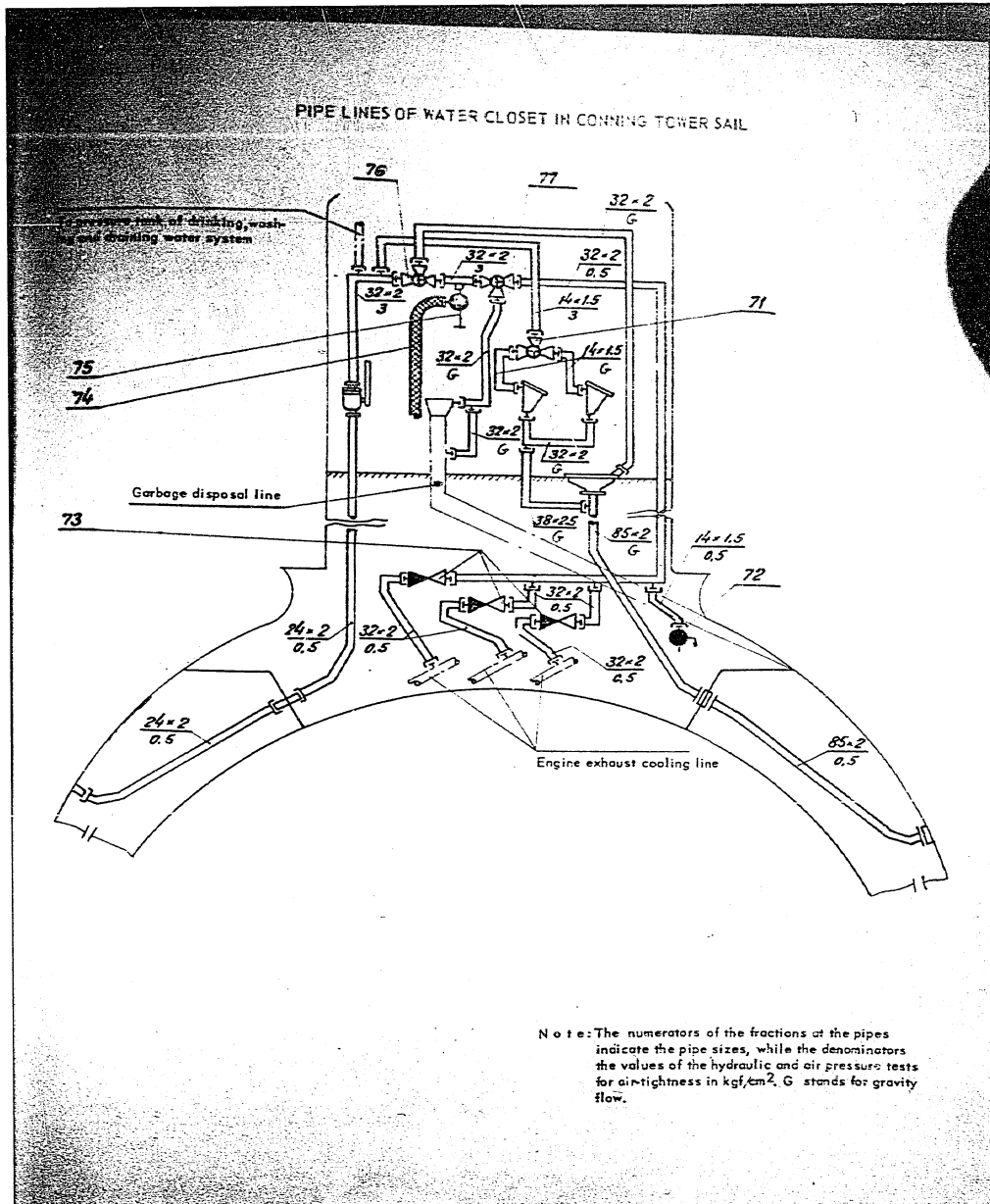


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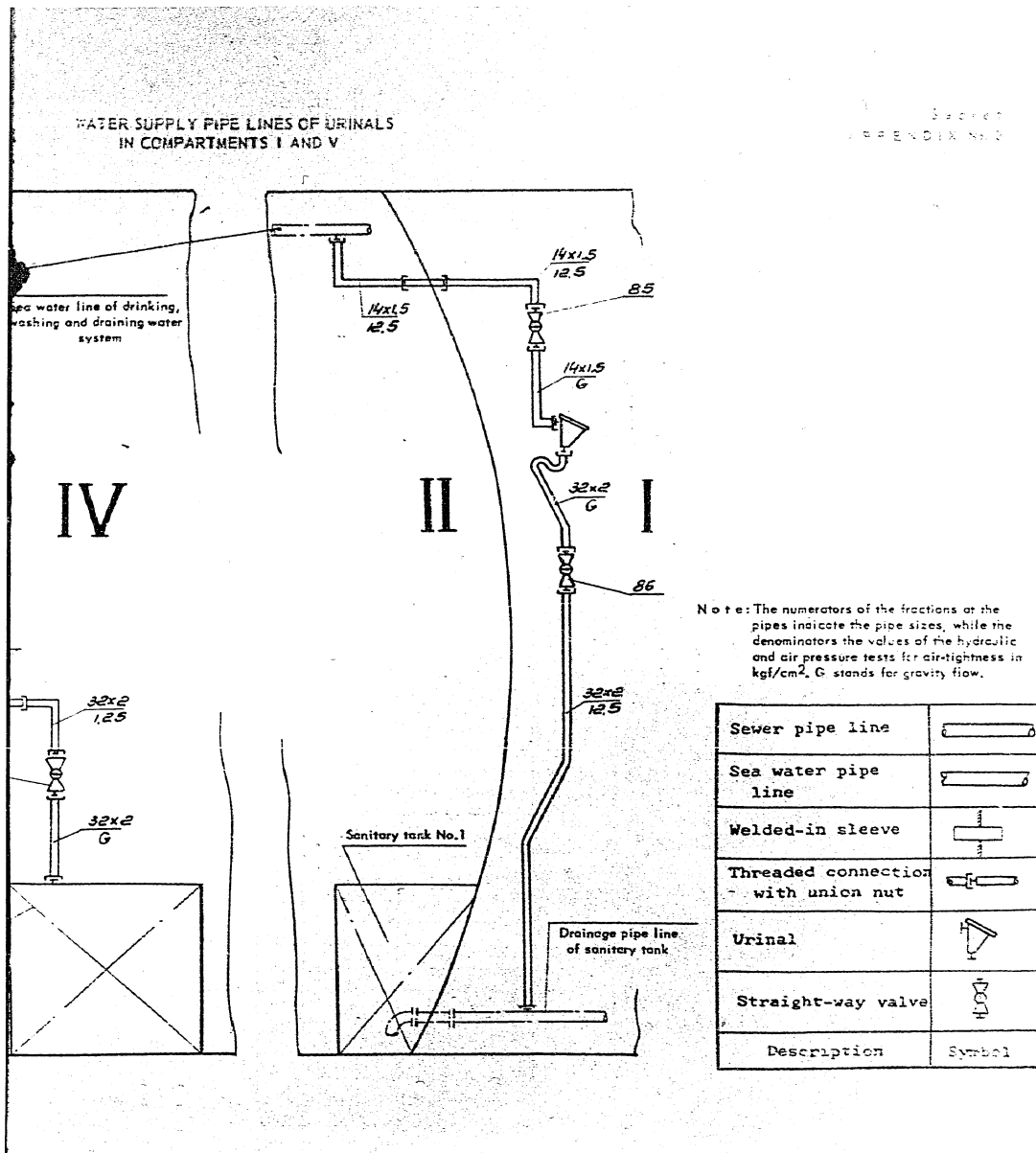


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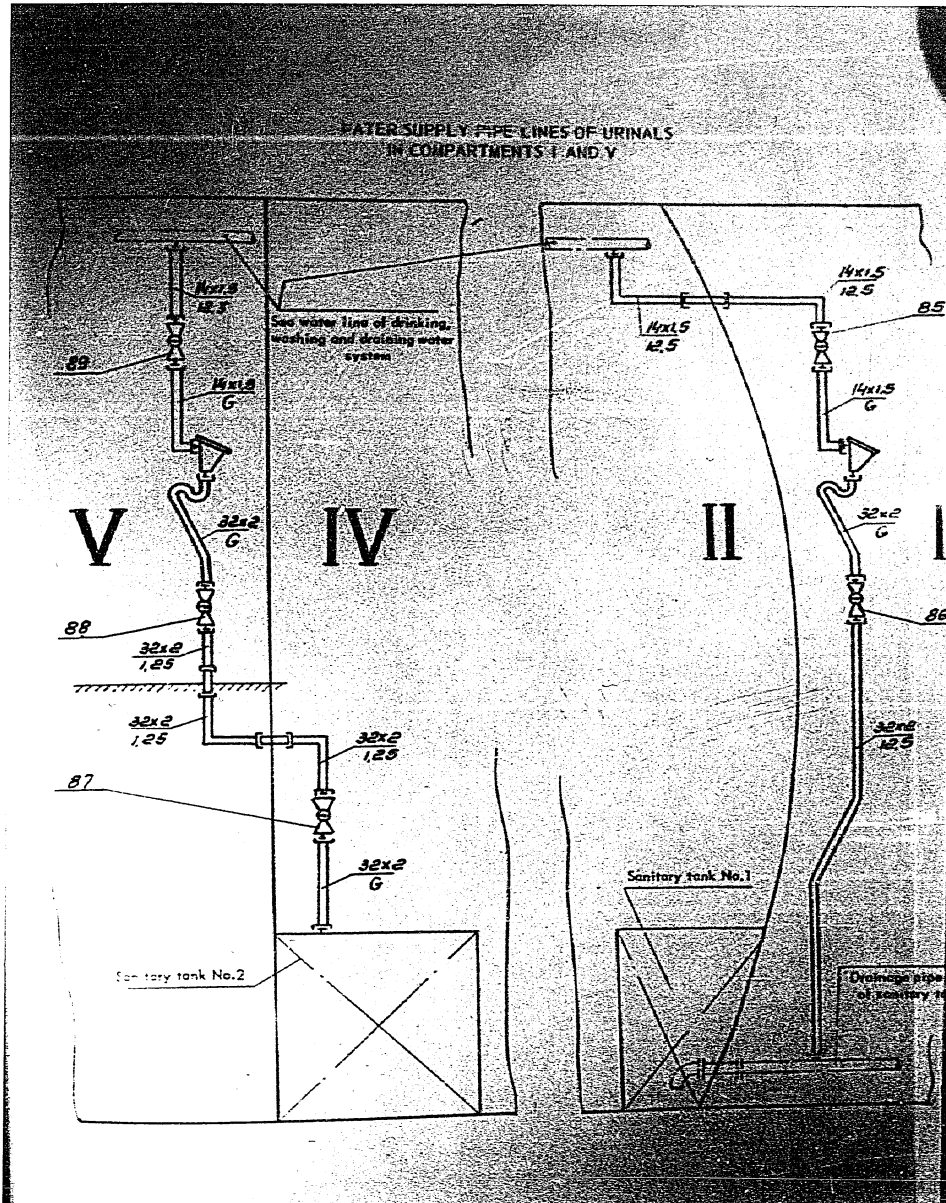


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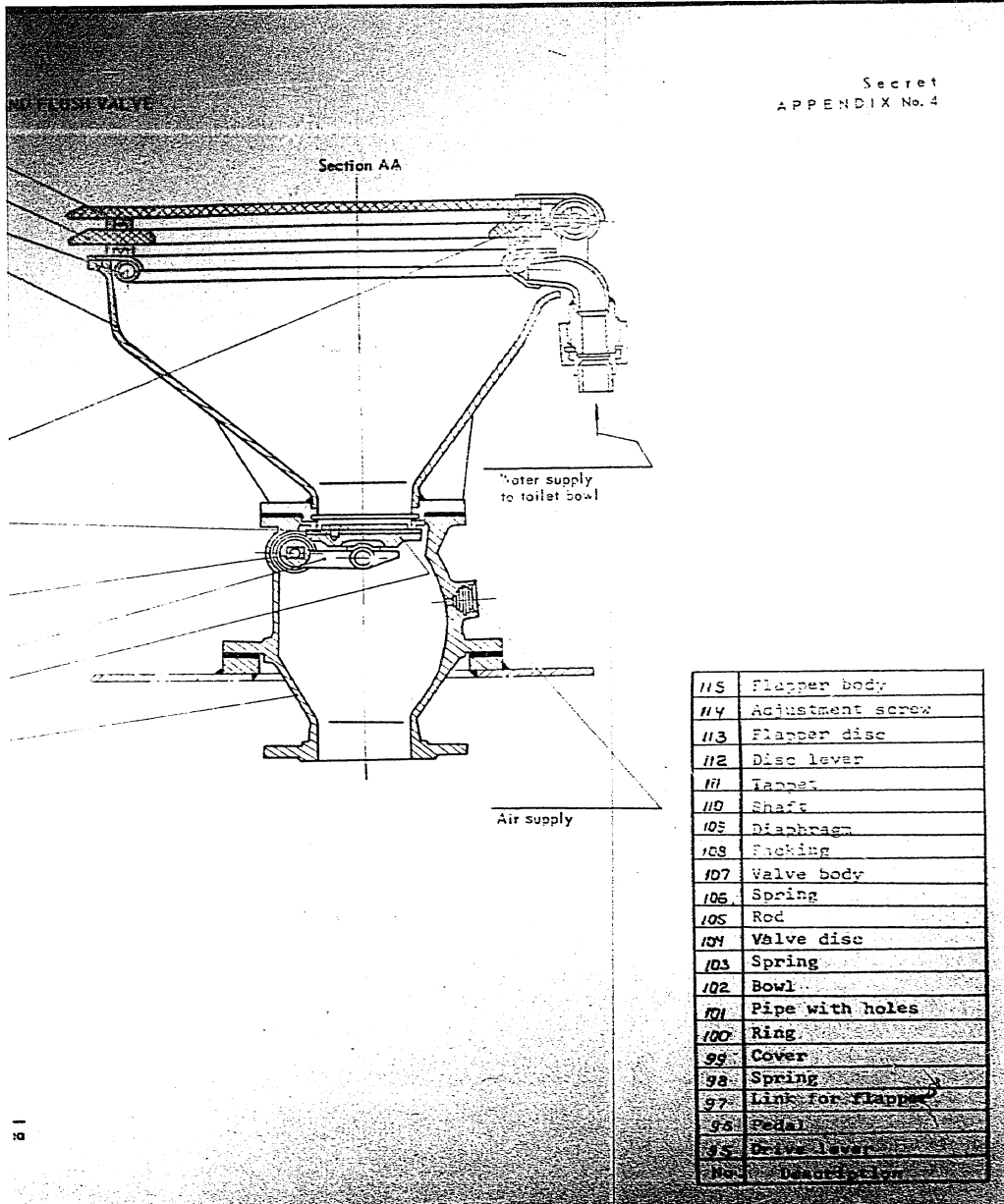


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TOILET BOWL WITH FLAPPER AND FLUSH VALVE

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97

99

100

101

102

103

104

105

106

107

108

109

110

111

112

113

114

115

Flapper

Flooring

Flush valve

96

95

Pipe connection for water supply from sea water pipe line

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